

# 21LR8

## High-Mu Triode—Beam Power Tube

### NOVAR TYPE

For Combined Vertical-Deflection Oscillator and Amplifier  
Service in Color TV Receivers

### ELECTRICAL CHARACTERISTICS

#### Bogey Values

Heater Current . . . . .	$I_f$	450	mA
Heater Voltage (AC or DC) at $I_f = 450$ mA . . . . .	$E_f$	21.0	V
Heater Warm-up Time (Average). . . . .		11	s
Direct Interelectrode Capacitances (Approx.)			
Without external shield			

#### Triode Unit:

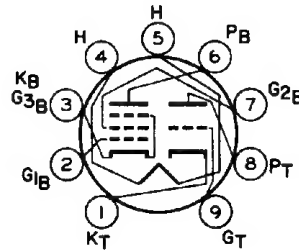
Grid to plate. . . . .	$C_{gp}$	6.0	pF
Input: $G_T$ to (KT, H). . . . .	$C_i$	6.5	pF
Output: $P_T$ to (KT, H). . . . .	$C_o$	1.6	pF

#### Beam Power Unit:

Grid No.1 to plate . . . . .	$C_{gp}$	0.7 max	pF
$G_{1B}$ to (KB + $G_{3B}$ , $G_{2B}$ , H). . . . .	$C_i$	16.0	pF
$P_B$ to (KB + $G_{3B}$ , $G_{2B}$ , H). . . . .	$C_o$	9.0	pF
$G_{1B}$ to $P_T$ . . . . .		0.12 max	pF
$P_B$ to $P_T$ . . . . .		0.32 max	pF

Basing Designation for BOTTOM VIEW . . . . . 9QT

- Pin 1—Triode Cathode
- Pin 2—Beam Power Grid No.1
- Pin 3—Beam Power Cathode & Grid No.3
- Pin 4—Heater
- Pin 5—Heater
- Pin 6—Beam Power Plate
- Pin 7—Beam Power Grid No.2
- Pin 8—Triode Plate
- Pin 9—Triode Grid



### CLASS A<sub>1</sub> AMPLIFIER

For the following characteristics, see Conditions

		Triode Unit	Beam Power Unit	
Amplification Factor	$\mu$	58	-	6.5 <sup>a</sup>
Plate Resistance				
(Approx.) . . . . .	$r_p$	16000	-	12000 $\Omega$
Transconductance . . . . .	$g_m$	3600	-	9300 $\mu\text{mhos}$
DC Plate Current . . . . .	$I_b$	2.3	200 <sup>b</sup>	56 mA
DC Grid-No.2 Current	$I_g$	-	20 <sup>b</sup>	3 mA
Cutoff DC Grid-No.1				
Voltage				
$I_b = 10 \mu\text{A}$ . . . . .	$E_c(\text{co})$	-6.6	-	- V
$I_b = 1 \text{ mA}$ (Approx.)	$E_c(\text{co})$	-	-	-26 V
$I_b = 100 \mu\text{A}$ . . . . .	$E_c(\text{co})$	-	-	-30 V



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## Conditions

		Triode Unit	Beam Power Unit		
Heater Voltage . . . . .	E <sub>f</sub>	21.0	21.0	21.0	21.0 V
Plate Voltage. . . . .	E <sub>b</sub>	250	45	135	120 V
Grid-No.2 Voltage. . . . .	E <sub>c</sub>	-	125	120	120 V
Grid-No.1 Voltage. . . . .	E <sub>c</sub>	-4	0	-10	-10 V

## MECHANICAL CHARACTERISTICS

Operating Position . . . . .	Any
Type of Cathodes . . . . .	Coated Unipotential
Maximum Overall Length (l <sub>m</sub> ) . . . . .	3.710 in
Maximum Seated Length (l <sub>m</sub> ) . . . . .	3.330 in
Length, Base Seat to Bulb Top (Excluding tip) . . . . .	2.810 to 2.990 in
Diameter (d) . . . . .	1.438 to 1.562 in
Envelope . . . . .	T12
Bases (alternates)	
Small-Button Novar 9-Pin (JEDEC No.E9-76)	
Small-Button Novar 9-Pin with Exhaust Tip 9-Pin (JEDEC No.E9-88)	

## VERTICAL-DEFLECTION OSCILLATOR (Triode Unit)

### Maximum Ratings, Design-Maximum Values

For operation in a 525-line, 30-frame system

DC Plate Voltage . . . . .	E <sub>b</sub>	400	V
Peak Negative-Pulse Grid Voltage . . . . .	e <sub>cm</sub>	400	V
Peak Cathode Current . . . . .	i <sub>km</sub>	105	mA
Average Cathode Current . . . . .	i <sub>k(av)</sub>	30	mA
Plate Dissipation . . . . .	P <sub>b</sub>	2.5	W
Peak Power Output . . . . .	P <sub>o</sub>	2.5	W

### Maximum Circuit Values

Grid-Circuit Resistance	R <sub>g(ckt)</sub>	
For grid-resistor-bias operation . . . . .		2.2 MΩ

## VERTICAL-DEFLECTION AMPLIFIER (Beam Power Unit)

### Maximum Ratings, Design-Maximum Values

For operation in a 525-line, 30-frame system

DC Plate Voltage . . . . .	E <sub>b</sub>	400	V
Peak Positive-Pulse Plate Voltage <sup>c</sup> . . . . .	e <sub>bm</sub>	2500 <sup>d</sup>	V
DC Grid-No.2 (Screen-Grid) Voltage . . . . .	E <sub>c</sub>	300	V
Peak Negative-Pulse Grid-No.1 (Control-Grid) Voltage. . . . .	e <sub>cm</sub>	250	V
Peak Cathode Current . . . . .	i <sub>km</sub>	260	mA
Average Cathode Current . . . . .	i <sub>k(av)</sub>	75	mA
Plate Dissipation <sup>e</sup> . . . . .	P <sub>b</sub>	14	W
Grid-No.2 Input <sup>e</sup> . . . . .	P <sub>c</sub>	2.75	W
Envelope Temperature . . . . .	T <sub>E</sub>	210	°C

### MAXIMUM CIRCUIT VALUES

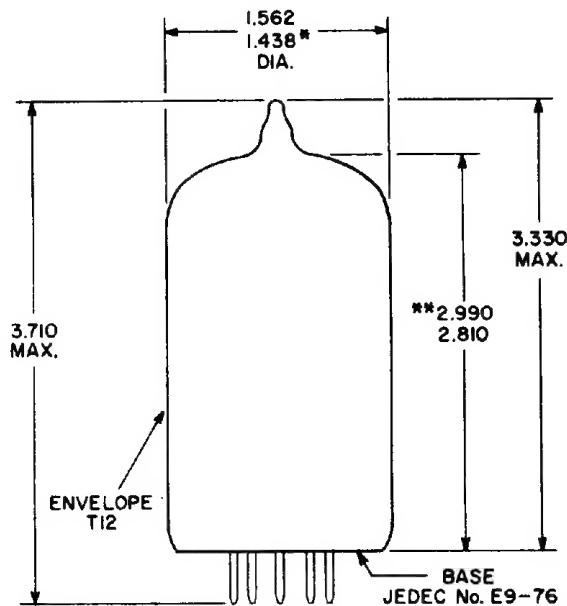
Grid-Circuit Resistance	R <sub>g(ckt)</sub>	
For fixed-bias operation . . . . .		1 MΩ
For grid-resistor-bias operation . . . . .		2.2 MΩ



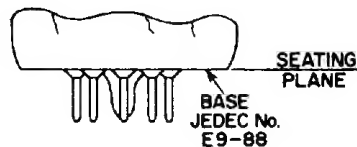
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- a Triode connection.
- b This value can be measured by a method involving a recurrent wave form such that the plate dissipation and grid-No. 2 input will be kept within ratings in order to prevent damage to the tube.
- c This rating is applicable where the duration of the voltage pulse does not exceed 15 per cent of one vertical scanning cycle. In a 525-line, 30-frame system, 15 per cent of one vertical scanning cycles is 2.5 milliseconds.
- d Absolute Maximum value.
- e An adequate bias resistor or other means is required to protect the tube in the absence of excitation.

### DIMENSIONAL OUTLINE Top Exhaust (JEDEC No. 12-65)



92CS-13502A



92CS-11127R3B

### DIMENSIONS IN INCHES

Bottom-exhaust version has the same dimensions for maximum overall length and seated length as the top-exhaust outline shown.

- \* Applies to the minimum diameter except in the area of the seal.
- \*\* Measured from the base seat to bulb-top line as determined by arcing gauge of 0.600" I.D.



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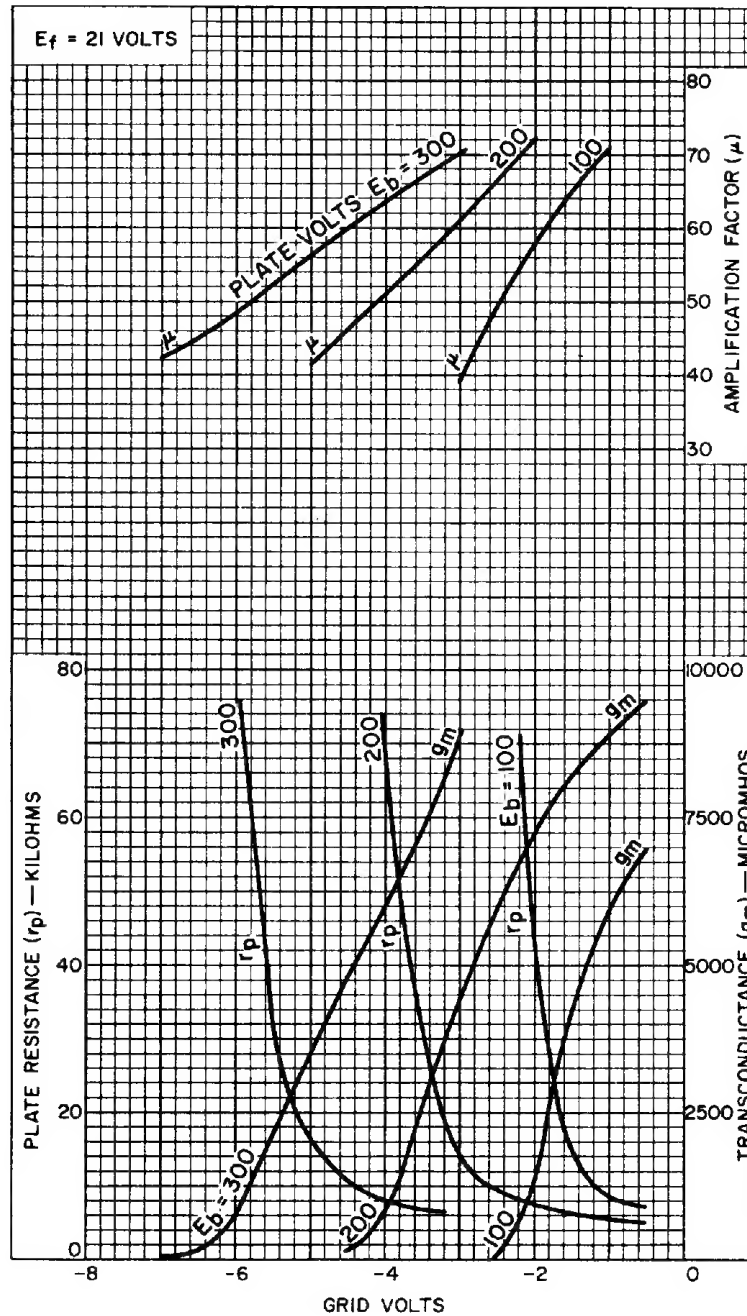
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## Typical Characteristics

Triode Unit



92CM-13506

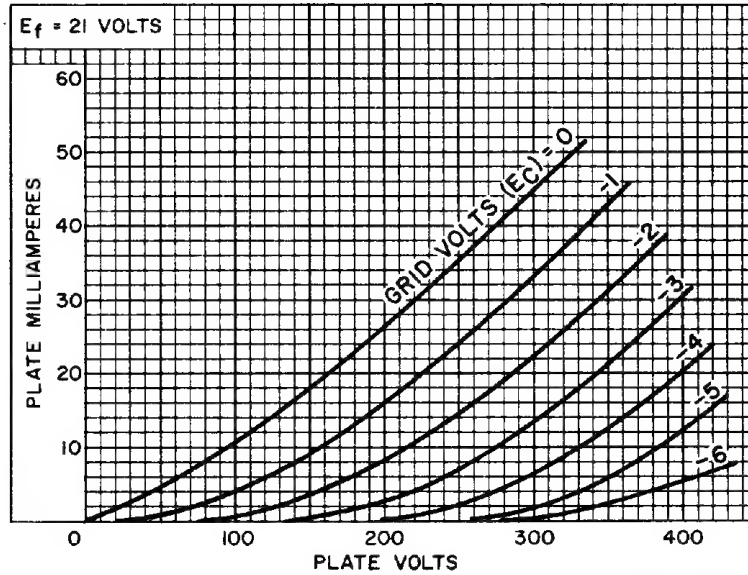
DATA 2

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# Typical Plate Characteristics

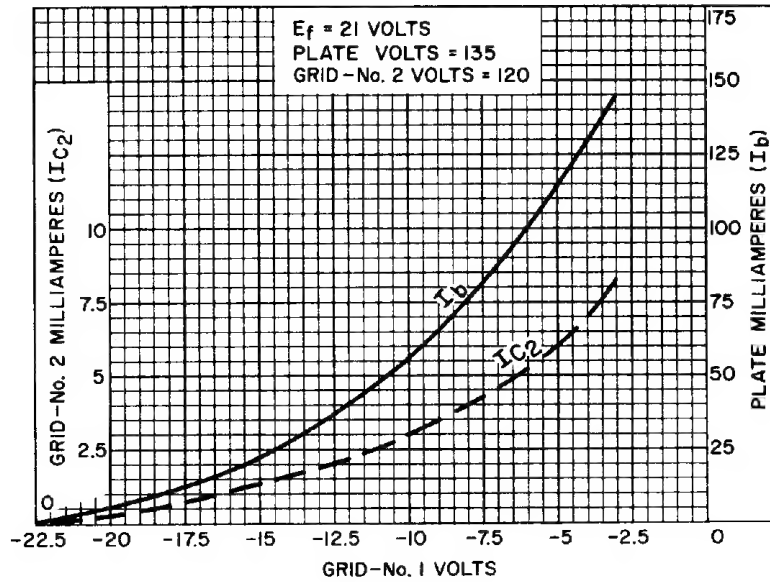
Triode Unit



92CS-13508

# Typical Characteristics

Beam Power Unit



92CS-13509

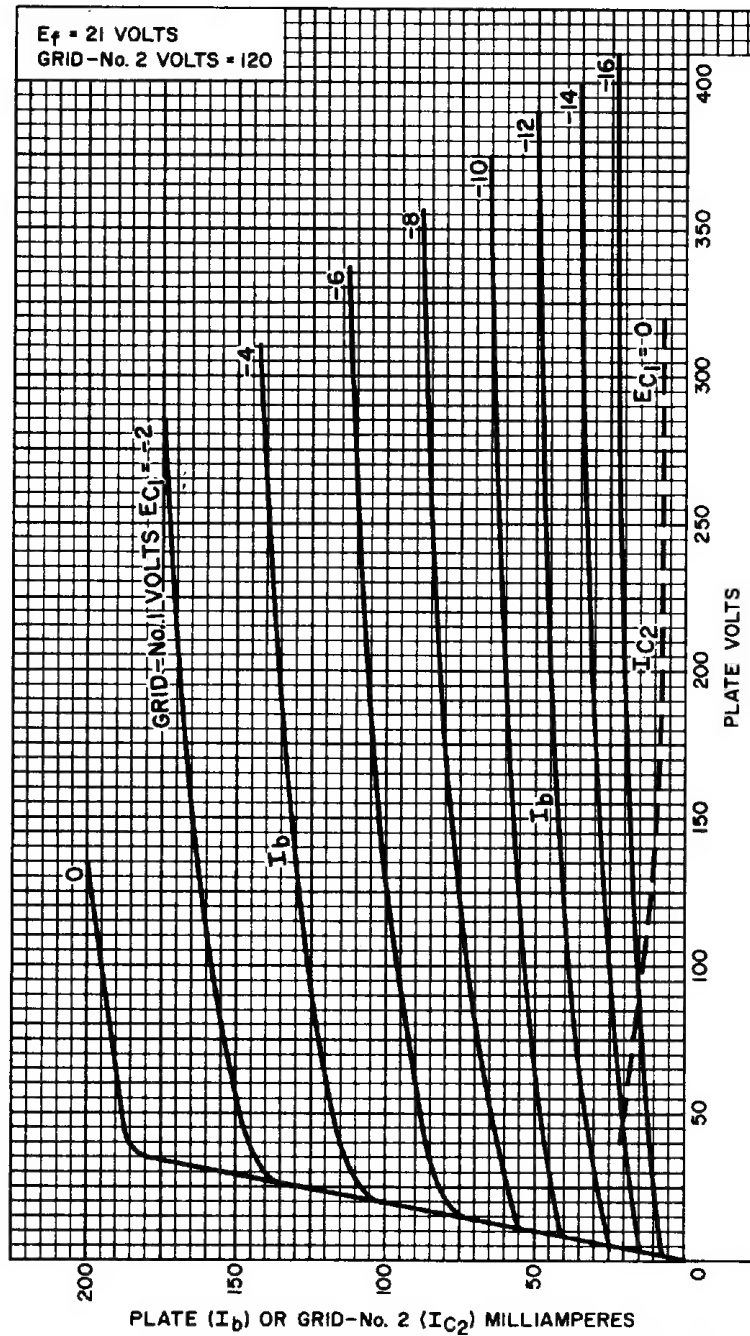


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Typical Characteristics  
Beam Power Unit



92CM-13507

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